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1776 K STREET, N. W.
WASHINGTON, D. C. 20006
(202) 429-7000

DAVID E. HILLIARD
(202) 429-7058

July 18, 1994

FACSIMILE
(202) 429-7049
248349 WYRN UR

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Mr. William F. Caton, Acting Secretary
Federal Communications Commission
Room 222 - Mail Stop 1170
1919 M Street, N.W.
Washington, D.C. 20554

EX PARTE OR LATE FILED

Re: Ex Parte Presentation - PR Docket 93-61
Automatic Vehicle Monitoring

Dear Mr. Caton:

On July 5, 1994, the Commission received an *ex parte* letter from the United States Global Positioning System Industry Council ("USGIC") in the above-referenced proceeding.¹ In response thereto, Pinpoint Communications, Inc. ("Pinpoint"), files this letter.

USGIC described itself as a trade association of manufacturers of global positioning system ("GPS") receiver equipment that integrate Part 15 spread spectrum data communications equipment in its tracking and reporting applications. The USGIC letter makes three assertions:

- That GPS, when integrated with existing data communications technologies, "can meet many or all of the needs" to be addressed by terrestrial Automatic Vehicle Monitoring ("AVM") in a more spectrally efficient manner.
- That the FCC should seek further comment on whether existing technologies such as GPS can meet the needs to be addressed by AVM.
- "It is our strong belief that consumer markets should determine optimum technology use."

¹ Letter of Randy D. Hoffman, Chairman, USGIC, to William F. Caton, Secretary, FCC, dated June 27, 1994 ("USGIC letter").

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Market Oriented Technology Choices

Taking up USGIC's last assertion first, Pinpoint agrees wholeheartedly that the competitive marketplace should be the forum in which the optimum use of technology should be determined. From "day one" in this proceeding, this is the opportunity Pinpoint has been seeking for its ARRAY™ system, both with respect to other wide-area AVM systems, but also other vehicle location systems such as GPS.² Moreover, Pinpoint strongly believes that the vehicle location marketplace is multi-faceted and one that can be served best if there are a variety of approaches to vehicle location. For this reason, despite the advantages Pinpoint maintains that the ARRAY™ system has over other location technologies, Pinpoint would assert that, at bottom, GPS and AVM are complementary technologies with varying strengths and weaknesses. Even USGIC prudently is reluctant to claim that GPS can do whatever terrestrial AVM can do. Generally speaking, terrestrial AVM provides far superior urban coverage, where there will be needs for high-frequency position updates in a radio environment characterized by lack of line-of-sight. GPS may be better suited for coverage in open areas, particularly along inter-city routes. Accordingly, the Commission need not, and should not, decide between the two types of technologies in Docket 93-61. Rather, through this proceeding, the Commission should facilitate the ability of the marketplace to decide the appropriate and acceptable uses for each of these location technologies.

The Communications Problem With GPS

USGIC's first assertion, that GPS combined with existing data communications technologies can meet "many or all" of the needs AVM will address in a more spectrally efficient manner, stands unsupported. Notably, in making this contention, USGIC does not attempt to respond to Pinpoint's extensive discussions of this issue in its Reply Comments and two *ex parte* submissions.³ As explained in these filings, an AVM network is a stand-alone system, complete in itself for the tasks of vehicle location, and does not need to be supported by other location, positioning, or radio communications technologies to provide service. In contrast, GPS, which was designed for in-vehicle navigation, requires augmentation on a number of different levels,

² See, e.g., Opposition of Pinpoint Communications, Inc., RM-8013, at 7-9 (filed July 23, 1992) (comparing the advantages of ARRAY™ to other location technologies and asking for the marketplace to decide among them for various applications).

³ Reply Comments of Pinpoint, PR Dkt. No. 93-61, Technical Appendix (Appendix B), at 4-6 (filed July 29, 1993); Letter of Louis H. M. Jandrell, Vice President - Design and Development, Pinpoint, to William Caton, Secretary, FCC, dated May 11, 1994 ("GPS Spectrum Needs Letter"); Letter of Louis H. M. Jandrell to Dr. Michael J. Marcus, Assistant Bureau Chief for Technology, Field Operations Bureau, FCC, dated May 27, 1994, at 2-4, 8-9 ("AVM/GPS Complementarity Letter"). Pinpoint incorporates herein these letters by reference thereto.

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including both communications and location functionalities, in order to support vehicle location applications, particularly in urban markets.

To utilize GPS for the support of high capacity AVM applications, including Intelligent Vehicle Highway System ("IVHS") applications, will require a significant dedication of spectrum, essentially no less than that sought by Pinpoint for shared use among wide-area systems in the 902-928 MHz band. Specifically, to support GPS in an application requiring 1,000 vehicle location updates per second in a market, Pinpoint has estimated that the total bandwidth required, *merely for position updates*, would be in the vicinity of 14 MHz. Additional spectrum would be required for related messaging. By way of comparison, Pinpoint's ARRAY™ network can provide up to 3,000 location updates per second, as well as capacity for associated messaging to support a variety of data-intensive IVHS applications, in 12 to 16 MHz of spectrum. See GPS Spectrum Needs Letter, at 2-3; GPS/AVM Complementarity Letter at 4. Moreover, as explained in a recently filed *ex parte* letter⁴ and its comments throughout this proceeding, the Pinpoint ARRAY™ system will be able to operate at this level of performance with a relatively high tolerance of potentially interfering signals from Part 15 devices.

Not only will GPS require a comparable amount of spectrum to support only the vehicle location capacity for high-capacity IVHS applications in urban centers, but to do so would be prohibitively expensive. As explained in the *AVM\GPS Complementarity Letter*, the per vehicle communications costs of GPS, assuming a very low frequency of updates -- ten per hour at \$0.05 each in the course of a nine-hour business day -- can be expected to be over \$100.00 per vehicle monthly. In contrast, the Pinpoint AVM system will cost approximately \$15.00 per vehicle monthly. Further, if a communications network were assembled with the capability to support GPS usage during the peak demand periods of IVHS applications, the costs of constructing such a network can be expected to be in the hundreds of millions of dollars in large metropolitan areas -- assuming the spectrum is available for such a network. In comparison, the ARRAY™ network will cost only a few million dollars in the largest of markets. See *AVM\GPS Complementarity Letter*, at 9.

The Augmentation Problem with GPS

Further, the functionality of GPS needs to be augmented substantially if it is to begin to provide the level of coverage in urban and suburban areas that AVM can provide. GPS can operate satisfactorily only when it the receiver has line of sight with a sufficient number of satellites. Terrestrial AVM, in sharp contrast, does not require

⁴ Letter June 27, 1994, to Ralph Haller, Chief, Private Radio Bureau, FCC, from Messrs. Hilliard, Yorkgitis, and Lewis.

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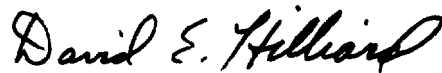
line of sight for coverage. In a metropolitan environment, GPS signals will often be blocked by ubiquitous obstructions such as buildings, foliage, overpasses, billboards, and parking garages. As Pinpoint explained in the *AVM\GPS Complementarity Letter*, a study performed in Calgary last August found that *in urban areas*, GPS receivers were unable to determine position for up to about 86% of the time. Even the best receivers used in the test, equipped with a 10-satellite card, were unable from one-third to one-half of the time to obtain a position fix. *Id.* at 4-5. Thus, GPS will need to be augmented by other location technologies, such as extrapolative projection, dead-reckoning, and map-matching to overcome its frequent unavailability in urban areas. The end result is that GPS is still unlikely to be as accurate as Pinpoint's ARRAY™ system in urban areas, but the on-board equipment, including radio, will cost approximately \$2,700 dollars⁵, or about *nine* times as much as the Pinpoint ARRAY™ TransModem. Moreover, even if the hardware costs were equal, as noted above, there is still the substantial problem of transmitting rapidly large quantities of position data back to a central location.

No Need for a Further Proceeding on GPS

Finally, a further round of comment is not necessary to determine whether GPS or terrestrial AVM should be the vehicle location choice of the American public. Pinpoint maintains that the two types of technology are complementary and each has a role to play in meeting this country's vehicle location needs. Moreover, as USGIC itself notes, there is a demand for vehicle location services and the marketplace should make the choice about exactly what the role of each vehicle location technology will be. A further round of comments is not necessary for the Commission to reach this conclusion in this proceeding, as it is consistent with the agency's spectrum allocation policies and general approach to new and competing technologies.

An original one copy of this letter is being filed as required by Section 1.1206(a)(1) of the Commission's rules on *ex parte* communications.

Respectfully,



David E. Hilliard
Edward A. Yorkgitis
Counsel for Pinpoint
Communications, Inc.

cc: attached list

⁵ See letter of May 16, 1994, from Trimble Navigation to Chairman Hundt and Commissioner Barrett (end of 1994 projected cost of \$2700 and end of 1996 projected cost of \$1,000).

**Chairman Reed E. Hundt
Federal Communications Commission
1919 M Street, N.W., Room 814
Washington, D.C. 20554**

**Ms. Jane Mago
Office of Commissioner Rachelle B. Chong
Federal Communications Commission
1919 M Street, N.W., Room 844
Washington, D.C. 20554**

**Ms. Lauren Belvin
Office of Commissioner James H. Quello
Federal Communications Commission
1919 M Street, N.W., Room 802
Washington, D.C. 20554**

**Commissioner James H. Quello
Federal Communications Commission
1919 M Street, N.W., Room 802
Washington, D.C. 20554**

**Commissioner Andrew C. Barrett
Federal Communications Commission
1919 M Street, N.W., Room 826
Washington, D.C. 20554**

**Commissioner Rachelle B. Chong
Federal Communications Commission
1919 M Street, N.W., Room 844
Washington, D.C. 20554**

**Commissioner Susan Ness
Federal Communications Commission
1919 M Street, N.W., Room 832
Washington, D.C. 20554**

**Ms. Ruth Milkman
Office of the Chairman
Federal Communications Commission
1919 M Street, N.W., Room 814
Washington, D.C. 20554**

**Mr. Rudolfo M. Baca
Office of Commissioner James H. Quello
Federal Communications Commission
1919 M Street, N.W., Room 802
Washington, D.C. 20554**

**Mr. James R. Coltharp
Office of Commissioner Andrew C. Barrett
Federal Communications Commission
1919 M Street, N.W., Room 826
Washington, D.C. 20554**

Ms. Rosalind Allen
Office of Commissioner Susan Ness
Federal Communications Commission
1919 M Street, N.W., Room 832
Washington, D.C. 20554

Mr. Byron F. Marchant
Office of Commissioner
Andrew C. Barrett
Federal Communications Commission
1919 M Street, N.W., Room 826
Washington, D.C. 20554

Mr. Richard K. Welch
Office of Commissioner
Rachelle B. Chong
Federal Communications Commission
1919 M Street, N.W., Room 844
Washington, D.C. 20554

Mr. Ralph Haller
Private Radio Bureau
Federal Communications Commission
2025 M Street, N.W., Room 5002
Washington, D.C. 20554

Mr. F. Ronald Netro
Private Radio Bureau
Federal Communications Commission
2025 M Street, N.W., Room 5002
Washington, D.C. 20554

Ms. Beverly G. Baker
Private Radio Bureau
Federal Communications Commission
2025 M Street, N.W., Room 5002
Washington, D.C. 20554

Mr. Martin D. Liebman
Private Radio Bureau
Federal Communications Commission
2025 M Street, N.W., Room 5202
Washington, D.C. 20554

Mr. John J. Borkowski
Private Radio Bureau
Federal Communications Commission
2025 M Street, N.W., Room 5202
Washington, D.C. 20554

Dr. Thomas P. Stanley
Office of Engineering and Technology
Federal Communications Commission
2025 M Street, N.W., Room 7002
Washington, D.C. 20554

Mr. Bruce A. Franca
Office of Engineering and Technology
Federal Communications Commission
2025 M Street, N.W., Room 7002-A
Washington, D.C. 20554

Mr. Richard M. Smith
Field Operations Bureau
Federal Communications Commission
1919 M Street, N.W., Room 734
Washington, D.C. 20554

Dr. Michael J. Marcus
Field Operations Bureau
Federal Communications Commission
1919 M Street, N.W., Room 734
Washington, D.C. 20554

Mr. Randy D. Hoffman
Chairman
United States GPS Industry Council
1100 Connecticut Ave., Suite 535
Washington, DC 20036